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NORTH AMERICAN SPECIES OF RAMULARIA.

WITH DESCRIPTIONS OF THE SPECIES.

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RAMULARIA, closely allied to *Cercospora*, and having the same general characters and mode of growth as that genus, is distinguished by its hyaline (colorless) hyphæ and conidia. The conidia (spores) are also often concatenate, *i. e.* produced in series or chains, one above the other, and attached to each other by their contiguous ends. They also vary considerably in shape, from nearly globose to ovoid, oblong or cylindrical, but are not prolonged or attenuated above as is usual in Cercospora. This, in fact, is the only character separating them from the *Cercosporas* with hyaline hyphæ (*Cercosporella*, Sacc.) The *Ramularias* with globose or ovoid conidia, are separated by Saccardo under the name *Ovularia*, but we have here included them all under *Ramularia*. The species are all biogenous, *i. e.* growing on *living* plants, mostly on the leaves, often on definite spots on the leaves. The mycelium spreading through the intercellular spaces of the leaf, sends out through the stomata, the fertile hyphæ at the extremities of which the conidia are produced. Conidia also, or oftener the scars that mark the place of their attachment after the conidia themselves have fallen, are seen along the sides of the fertile hyphæ, but this generally arises from the fact that the growth of the hypha is not arrested with the formation of the first terminal spore, but pushes its apex obliquely by the spore which thus becomes lateral, another terminal spore being formed above the first and generally on the opposite side of the hypha, and this process may be several times repeated, the hypha becoming thus abruptly bent this way and that

(g e niculate) something like the rachis in a head of wheat. When the hyphæ have reached the limit of their elongation their apices often become slightly enlarged and bear 2—3 conidia standing nearly side by side.

The species may be arranged as follows:

A. Conidia oblong or cylindrical.
- *a. Spots white or gray*, 1—11.
- *b. Spots brown or brownish*, 12—30.
- *c. Spots indefinite or none*, 31—35.

B. Conidia ovate.
- *a. Conidia continuous*, (*Ovularia*, Sacc.) 36—39.
- *b. Conidia uniseptate*, 40.

A. condia oblong or cylindrical.

a. Spots white or gray.

1. Ramularia aquatilis, Pk. 35th Rep. N. Y. State Mus., p. 142.

Spots small, pale. Hyphæ epiphyllous, tufted, very slender, short, flexuous, hyaline. Conidia subfiliform, narrowed toward one end, sometimes 3—4 nucleate, colorless, 20—30 x 2½—3 μ.

On living leaves of *Potamogeton lonchites*, Sept., Albany, N. Y. (Peck.)

The tufts are numerous, very small and white. When magnified they have a stellate appearance, the conidia diverging like rays.

2. Ramularia Prini, Pk. (ined.)

Amphigenous, on suborbicular, white, definitely limited spots (2—3 mm.), and mostly surrounded with a purplish discoloration. Hyphæ fasciculate, simple, entire or faintly denticulate above, 12—20 x 2½ μ. Conidia oblong-cylindrical, continuous, of about the same dimensions as the hyphæ.

On leaves of *Prinos* (*Ilex*) *verticellata*, Casoga, N. Y., July (Peck.)

In the specimens received from Peck, the *Ramularia* was accompanied by a *Cladosporium* with scattered brown hyphæ 50—70 μ long.

3. Ramularia Diervillæ, Pk. (ined.)

Hypophyllous, on small, round, white spots, 2—3 mm. in diameter, with a narrow, slightly raised, dark colored border. Conidia cylindrical, continuous or faintly septate, borne on short, fasciculate hyphæ.

On living leaves of *Diervilla trifida*, Adirondack Mts., N. Y. (Peck.)

4. Ramularia Celastri, E. & M. Am. Nat. Dec. 82, p. 1005.

Spots small, white, border dark brown. Hyphæ subhyaline, fasciculate, 24 x 3 μ. Conidia oblong-cylindrical, hyaline, guttulate, uniseptate, 18—21 x 3 μ.

On leaves of *Celastrus scandens*, Pennsylvania (Martin), Kansas (Kellerman), Wisconsin (Trelease), who finds the conidia 1—4 celled. *R. Celastri*, Pk. in 33d Rep. is the same.

5. Ramularia Plantaginis, E. & M., l. c.

Spots small, round, whitish, border reddish brown. Hyphæ fascicu-

late, continuous, hyaline, subgeniculate, equal, 35—40 x 3—3½ μ, simple or subramose, tips acute or obtuse. Conidia cylindrical, 1—2-septate, 15—38 x 4 μ, with ends rather obtusely rounded.

On leaves of *Plantago major*, New Jersey to Kentucky (Kellerman) and Wisconsin (Trelease.)

6. RAMULARIA CELTIDIS, E. & K. n. s.

Amphigenous, on small (1—2 mm.), round spots with a thin, white center, and a brown margin limited by a well-defined, narrow, slightly raised line. Hyphæ very short (5—8 x 2½ μ), entire, hyaline, growing in little tufts which appear like a fine, white powder sprinkled over the spots. Conidia nearly cylindrical hyaline, straight or slightly curved, 1—3 septate, 25—50 x 2—2½ μ.

On leaves of *Celtis occidentalis*, Sept., Kansas (Kellerman.) Approaches Cercospora.

7. RAMULARIA TULASNEI, Sacc. Mich. I, p. 536.

Spots grayish white with a broad, red-shaded border. Hyphæ fasciculate, hyaline, simple, 30—40 x 3 μ. Conidia cylindrical, continuous or 1—2-septate, hyaline, 20—35 x 2½—4½ μ.

On leaves of *Fragaria*, throughout the country.

Mr. F. S. Earle has given a minute account of the injury done by this parasite to the cultivated strawberry, in a paper read at the annual meeting of the Miss. Valley Hort. Soc. at New Orleans, Jan. 1885. Prof. Trelease, in his Prelim. List of the Parasitic Fungi of Wisconsin (1884) remarks that this fungus appears to pass the winter in black, stromatoid sclerotia which protrude from the surface of the leaf, and that in the spring, conidial threads grow out of these bodies and quickly fruit. He also gives *R. Fragariæ*, Pk. in 34th Rep. as a synonym of this.

8. RAMULARIA ARVENSIS, Sacc., Mich. II. p. 548, Fungi Ital. tab. 1000.

Spots suborbicular, whitish minute, with a red border. Hyphæ epiphyllous, fasciculate, subsimple, continuous hyaline, denticulate. Conidia cylindrical or continuous, 1-septate, 22—26 x 2½—4 μ, briefly catenulate, hyaline.

On *Potentilla Norvegica*, Ohio (Kellerman), Wisconsin (Trelease), New Hampshire (Farlow).

9. RAMULARIA ARMORACIÆ, Fckl. Symb. Myc., p. 361.

Tufts loose, white, on dry, orbicular spots. Hyphæ fasciculate, simple. Conidia cylindrical, subventricose, simple (continuous), hyaline, 22 x 5 μ.

On leaves of *Nasturtium Armoracia*, N. Y. (Peck), Wisconsin (Trelease), Kansas (Kellerman).

10. RAMULARIA URTICÆ, Ces. (in Rab. Herb. Mycol. 1680).

Spots gray, small, 1—3 mm., indefinite, thickly scattered over the leaf and visible on both sides. Hyphæ hypophyllous, loosely fasciculate, subeffused, hyaline, continuous, 30—40 μ long, subdenticulate above, often with one or more lateral "knee-like projections" above (incipient

branches ?) and with tips subacute, or obtuse. Conidia varying from acutely elliptical, 6—10 x 2½—3 μ to narrow cylindrical, 15—25 μ long, continuous or rarely 1—2 septate, concatenate, the chains of spores often branching. This last character is (as Fresenius remarks) easily recognizable, even in single isolated spores in which, particularly the longer, cylindrical ones which form the lower part of the chain, a little lateral globose sphere is often seen just below the apex, being, in fact, the commencement of a new chain or branch. The author last cited also remarks that the hyphæ with obtuse tips show 2—5 scars marking the point of attachment of as many spores. In the Iowa specimens we have seen hyphæ with at least three of these scars on a single tip.

On leaves of *Urtica gracilis*, Wisconsin (Trelease), Iowa (Holway).

11. RAMULARIA EUONYMI, E. & K., Jour. Mycol., I, 3.

Amphigenous, on dirty white spots, 2—3 mm. in diameter, with a dark but scarcely raised border. Hyphæ arising from a tubercular base, cæspitose, hyaline, simple and subentire or slightly toothed above; conidia concatenate, oblong-cylindrical, mostly 1-septate, (occasionally 2—3 septate) hyaline, 20—25 x 3 μ. Accompanied by minute, black, immature perithecia scattered over dead parts of the leaf, the whole being probably the conidial and pycnidial stage of some Sphærella. This has much the same general appearance as *Cercospora Euonymi*, Ell., but the spots are larger and more irregular in shape without any distinct colored border, and the character of the conidia show it to be quite distinct from that species.

On leaves of *Euonymus atropurpureus*, Oct., Kansas (Kellerman.)

b. Spots brown or brownish.

12. RAMULARIA HAMAMELIDIS, Pk., 35th Rep. N. Y. State Mus., p. 141.

Spots small, angular, reddish brown, a little paler on the lower surface. Hyphæ hypophyllous, tufted, short, slightly colored. Conidia fusiform or oblong-cylindrical, colorless, 12—35 μ long.

On living leaves of *Hamamelis Virginica*, July. Tufts very minute, scarcely visible to the naked eye. N. Y. (Peck.)

13. RAMULARIA RUDBECKIÆ, Pk., 34th Rep. N. Y. State Mus., p. 47.

Spots variable in size, frequently confluent, angular, included by the veinlets, brown. Hyphæ hypophyllous, tufted, short. Conidia subcylindrical, rounded at the ends, colorless, 30—50 μ long, sometimes concatenate and obscurely septate.

On living leaves of *Rudbeckia laciniata*, Catskill Mts., N. Y. (Peck.)

14. RAMULARIA IMPATIENTIS, Pk., l. c.

Spots few, suborbicular, reddish brown, the margin subindeterminate. Hyphæ very short and inconspicuous, 10—15 x 3—4 μ, oblong or clavate, denticulate above. Conidia epiphyllous, oblong, subacute, granular, 15—22 x 4 μ. The tufts or hyphæ are very minute and appear like a fine, white mould on the brown spots.

On *Impatiens fulva*, N. Y. (Peck.)

15. RAMULARIA RUFO-MACULANS, Pk. l. c.

Spots numerous, often confluent and occupying nearly the whole leaf, dull red. Hyphæ very short, hypophyllous, tufted. Conidia concatenate, variable, elliptical oblong or cylindrical, colorless, 8—16 x 3—4 μ.

Living leaves of *Polygonum amphibium*, var. *terrestre*, Sept., Albany, N. Y. (Peck), Kansas (Kellerman.) Sometimes the spots have a paler or greenish yellow margin, and, when they are abundant and confluent, the leaf presents a dingy red hue. Closely allied to *R. Bistortæ*, Fckl.

16. RAMULARIA SAMBUCINA, Pk. l. c.

Spots small, orbicular, scattered, pallid or reddish brown, surrounded by a blackish-brown border. Hyphæ hypophyllous, tufted, short, irregular above, colorless. Conidia oblong or subcylindrical, slightly narrowed at the extremities, colorless, 20—35 x 5—7 μ, sometimes concatenate, rarely uniseptate.

On living leaves of *Sambucus Canadensis*, Catskill Mts., N. Y. (Peck.)

17. RAMULARIA ANGUSTATA, Pk. (ined.)

"Spots small, orbicular, sometimes confluent, pale greenish-yellow, frosted beneath by the fungus. Hyphæ minute. Conidia narrowly fusiform or subcylindrical, 7—10 x 2½ μ, often containing two or more nuclei.

On living leaves of *Azalea nudiflora*, June." N. Y. (Peck.)

18. RAMULARIA MIMULI, E. & K., Am. Nat. Nov. 1883, p. 1166.

Spots suborbicular, ¼—½ cm., with a dark, shaded border which is more conspicuous above. Hyphæ mostly hypophyllous, subfasciculate, continuous, subhyaline, 30—50 x 3 μ. Conidia cylindrical, hyaline, uniseptate, 30—40 x 3 μ.

On leaves of *Mimulus ringens*, Kansas (Kellerman.) Closely allied to *R. Phyteumatis*, Sacc. & Winter.

19. RAMULARIA ORONTII, E. & M., Am. Nat., Feb, '84, p. 189.

Spots large, pale brown, border darker. Hyphæ epiphyllous, 30 x 3 μ, apices mostly bifid. Conidia hyaline, oblong with the ends subacute, uniseptate, abundant, 18 x 4 μ.

On leaves of *Orontium aquaticum*, Newfield, N. J.

20. RAMULARIA ANDROMEDÆ, E. & M., l. c.

Hypophyllous, forming dull white orbicular patches about 1 cm. in diameter, with a red-brown spot of the same extent on the opposite side of the leaf. Hyphæ simple or branched, continuous, 30—40 x 3 μ. Conidia oblong or cylindrical, continuous or uniseptate, 10—20 x 1½—2 μ.

On leaves of *Andromeda racemosa*, Newfield, N. J. *R. Vaccinii*, Pk. in 35th Rep., (on V. corymbosum, and V. Pennsylvanicum) does not appear to us to be distinct from this.

21. RAMULARIA VARIABILIS, Fckl. Symb. p. 361.

Spots dull brown, irregular, rather indefinitely limited (2—5 mm.), often abundant and confluent, giving the leaf a dead, withered look. Hyphæ amphigenous, fasciculate, simple, short (8—12 μ). Conidia subconcatenate, variable, acutely elliptical, ovate, oblong or cylindrical, 8—22 x 3—4 μ, (18—22 x 3—4 μ, Sacc.) mostly (in the specimens examined) less than 15 μ long (8—15 μ), the longer ones uniseptate.

On leaves of *Verbascum Thapsus*, Catskill Mts., N. Y. (Peck) and probably in other localities.

22. RAMULARIA MITELLÆ, Pk. 33d Rep. N. Y. State Mus., p. 30.

Spots suborbicular, brown. Hyphæ hypophyllous, minutely tufted, short, nearly straight, slightly colored. Conidia straight, oblong or cylindrical, colorless, unequal in length, 8—20 x 3 μ.

On living leaves of *Mitella diphylla*." N. Y. (Peck.)

23. RAMULARIA NEMOPANTHIS, C. & P. 29th Rep. N. Y. State Mus., p. 52.

Spots brownish, darker above, indefinite. Hyphæ hypoyhyllous, fasciculate, short. Conidia fusiform or cylindrical, 20 x 4 μ.

On leaves of *Nemopanthes Canadensis*, N. Y. (Clinton), New Hampshire (Farlow).

24. RAMULARIA BRUNNEA, Pk., 30th Rep. N. Y. State Mus., p. 55.

Spots brown, unequal, suborbicular, sometimes confluent. Hyphæ occupying the larger spots and giving them an ashy tint, epiphyllous, short, delicate. Conidia cylindrical, colorless, very unequal in length, 12—40 x 3½ μ.

On living leaves of *Tussilago Farfara*, N. Y. (?) (Peck.)

We have seen no specimens.

25. RAMULARIA ASTRAGALI, Ell. & Hol. Jour. Mycol., I, p. 6.

Spots 2—4 mm., lead-colored below, brown above. Hyphæ hypophyllous, fasciculate, continuous or faintly septate, nearly hyaline, but with a faint yellowish tinge, undulate and subgeniculate, 80—112 x 3—4 μ. Conidia oblong-elliptical, uniseptate, hyaline, 15—22 x 7—9 μ.

On leaves of *Astragalus Canadensis*, Iowa (Holway.)

This, though allied to the preceding species is quite distinct on account of its large, differently colored spots and broader conidia, which, so far as we can see, are not concatenate.

26. RAMULARIA OXALIDIS, Farlow. Appalachia, III, p. 251 (1884).

Amphigenous, forming small, circular, blackish spots, with a light-colored center. Hyphæ hyaline, very numerous, densely packed together, 55—75 x 3—4 μ, the shorter ones simple, the longer ones vaguely branching. Conidia hyaline, linear oblong, blunt pointed at both ends, 15—27 x 3—4 μ, one celled but occasionally with an imperfect septum.

On *Oxalis acetosella*, New Hampshire (Farlow.)

27. RAMULARIA ACTÆÆ, Ell. & Hol. n. s.

Amphigenous but mostly hypophyllous, appearing at first in patches of irregular outline, limited partly by the veinlets of the leaf which soon becomes yellowish in the affected parts, then dark brown or nearly black, in irregular spots .2—.5 cm. across, with a sub-angular outline. Hyphæ fasciculate, continuons, hyaline, nearly straight, sparingly denticulate above, 25—35 x 4—5 μ (exceptionaly 50—75 μ long). Conidia oblong-cylindrical, nucleate and mostly 1-septate, 15—35 x 3½—5 μ (mostly 25 x 5 μ).

On leaves of *Actæa alba*, Iowa, June (Holway). Allied to *R. didyma* Unger, but differs in its mostly shorter, straighter hyphæ and smaller *oblong* conidia.

28. RAMULARIA DECIPIENS, E. & E., Jour. Mycol. I, p. 70.

Spots orbicular, gray, ¼—½ cm., with a darker colored, narrow, raised border. Tufts amphigenous, scattered, whitish. Hyphæ fasciculate, issuing in dense clusters through the stomata of the leaf, hyaline, continuous, nearly straight, entire or subdenticulate above, 30—50 x 3 μ. Conidia clavate oblong or simply oblong or more commonly cylindrical, 1-septate and mostly slightly constricted at the septum, exceptionally 2 or 3-septate, 15—35 x 6—8 μ. ends obtusely rounded.

On leaves of *Rumex crispus*, Ohio, June 1883 (Kellerman.)

29. RAMULARIA RANUNCULI, Pk. 35th Rep. N Y. State Mus., p. 141.

Spots suborbicular, scattered, brown. Hyphæ hypophyllous, tufted, colorless, subflexuous. Conidia oblong, sometimes narrowed towards one end, continuous or 1-septate, occasionally catenulate, colorless, 12—50 x 8—13 μ.

On living leaves of *Ranunculus recurvatus*, West Albany, N. Y., June (Peck). We have seen no specimens, but should suspect this might be a form of *R. didyma*, Unger.

30. RAMULARIA ULMARIÆ, Cke., Grev. IV, p. 109. *R. Spirææ*, Pk. 34th Rep. N. Y. State Mus, p. 46.

"Tufts grayish-white, forming irregular, ovate or angular spots, mostly circumscribed by the veins. Flocci very short. Spores cylindrical, obtuse, simple, hyaline, 30—40 x 7 μ." The above is copied from Grevillea, l. c.

The specimens in Rabh-Winter, F. Eu. 2887, have reddish-brown, subangular spots (1—3 mm.) with a narrow, reddish purple, slightly raised border, the center of the spots becoming, at length, dull white. Hyphæ in scanty tufts, short, continuous. Conidia oblong-fusiform or cylindrical, 12—30 x 3 μ, the shorter ones simple or 1-septate, the longer ones 2—3-septate. Of Winter's specimens, those in envelope marked (*a*) have the spots more indefinite and surrounded with a broad, purple, shaded border, without any very distinct raised margin. We have seen no specimens of *R. Spirææ*. Pk., but, judging from the description, it seems to us better to place it as a synonym, at least till the question of its identity with *R. Ulmariæ*, Cke., can be decided from the examination of authentic specimens. It will be noted that Winter's specimens have the conidia mostly septate and narrower than stated by Cooke in Grevillea, and correspond well to the description of *R. Spirææ*, Pk., on Spiræa opulifolia.

c. *Spots none or indefinite.*

31. RAMULARIA DESMODII, Cke., Hedwigia, Mar. 1878, p. 39. *Fusidium Ravenelianum*, Thuem., in Flora, (1878 no. 12.)

Hypophyllous, spots obsolete but leaves mottled with pale yellow above. Hyphæ forming irregular patches at first limited by the veinlets,

finally more or less confluent, hyaline, mostly simple, continuous or faintly 1—2 septate, subundulate and geniculate, 50—80 x 3—4 μ, tips mostly obtuse and showing the marks of attachment of 2—3 conidia one of which is also borne at each lateral projection or knee as indicated by the scars. Conidia oblong, fusiform-oblong or clavate-oblong, mostly a little curved, 1-septate, rarely 2—3-septate, hyaline, 12—24 x 3½—4 μ.

On leaves of various species of *Desmodium* from Carolina (Ravenel) to Iowa (Holway), Kansas (Kellerman) and Wisconsin (Trelease); var. *epiphylla*, on leaves of *Astragalus*, Wisconsin (Trelease), differs in its epiphyllous growth and the entire absence of any spots. It forms minute white, punctiform specks scattered rather sparingly over the leaf, and the conidia are perhaps a little larger and with a yellowish tint.

32. RAMULARIA FILARIS, Fres., Beitrag., p. 90.

Hypophyllous, whitish at first then yellowish, short (15—25 μ), fasciculate, continuous, subgeniculate. Conidia oblong to cylindrical, concatenate, 1-septate, 12—30 x 3½—4 μ. The upper surface of the leaf opposite the patches of hyphæ is pale yellowish at first, finally brown. There are no definite spots, the patches of hyphæ being at first limited by the areas formed by the veinlets of the leaf, but at length more or less confluent.

On living leaves of *Aster puniceus*, New Hampshire (Farlow). On leaves of *Aster*, Iowa (Holway). This appears to be the same as specimens in Kunze's Fungi Selecti, 498, but specimens in Rab. Winter, Fungi Eur. 3185, are amphigenous on quite pronounced dull greenish-brown spots, with shorter continuous conidia. Fresenius describes and figures the hyphæ (at least some of them) with a bristle-like prolongation above which we have not been able satisfactorily to make out, nor is this appendage figured by Saccardo in his Fungi Italici, 1004.

33. RAMULARIA HERACLEI (Oud.) Sacc. Fungi Ven. Nov. V., p. 187. *Cylindrosporium Heraclei*, Oud. Mat. Fl. Mycol. Fland, II, p. 301.

Epiphyllous, on brown, subangular, indefinitely limited spots (2—4 mm.) Hyphæ very short, hyaline. Conidia oblong-cylindrical, 18—30 x 4—5 μ, the shorter ones 1-septate, the longer ones 3—septate and subattenuated above.

On leaves of *Heracleum lanatum*, Massachusetts (Farlow).

34. RAMULARIA VIRGAUREÆ, Theum. Fungi Austriaci, 1072.

Tufts effused, mostly hypophyllous, on pale, irregularly shaped, subangular areas of the leaf which shows yellow patches above (becoming brown). Hyphæ in small, compact tufts, hyaline, mostly short and entire but sometimes 60—75 μ and denticulate above. Conidia cylindrical, 1-septate, 15—55 x 4 μ or elongated to 60—75 μ, and 3-septate, hyaline.

On living leaves of *Solidago*, from New Jersey to Kansas (Kellerman). This is certainly the same as the specimens in de Theumen's Fung. Aust. and in Kunze's Fungi Selecti. 398, though the specimens in both these collections show some conidia even longer than the N. J. or Kansas specimens.

This and the preceding species might with about equal propriety be referred to *Cercospora*.

35. RAMULARIA GRINDELIÆ, E.& K. Bull. Torr. Bot. Club, XI, p. 122. Amphigenous, erumpent, punctiform. Hyphæ densely tufted, simple hyaline, nearly straight, 18—25 x 3—4 μ. Conidia cylindrical, straight or slightly curved, hyaline, 1—2-septate, 20—40 x 3—4 μ. The tufts of hyphæ (150—200 μ in diameter) are collected in little groups forming rusty-yellow specks thickly scattered over both sides of the leaf and finally whitening out.

B. CONIDIA OVATE.

a. Conidia continuous. (*Ovularia*, Sacc.)

36. RAMULARIA MONILIOIDES, E. & M., sub *Ovularia*, in Am. Nat., Jan. 1885, p. 76. *Ovularia Myricæ*, *Pk. in literis.*

On reddish-brown, round spots, 1—4 mm. in diameter. Hyphæ hypophyllous, fasciculate, hyaline sparingly septate and often branched above, 35—60 x 3 μ. Conidia concatenate, 2—4 connected, obovate, hyaline, continuous, 12—17 x 9—12 μ.

On living leaves of *Myrica*, Magnolia, Mass., June 1884 (Miss Clarke.) Adirondack Mts., N. Y. (Peck.)

The hyphæ are often elongated to 100 and even 120 μ.

37. RAMULARIA OBOVATA, Fckl. Symb. Mycol. p. 103.

Spots mostly orbicular, arid, 2—8 mm. Hyphæ amphigenous but mostly hypophyllous, fasciculate, simple or subramose, hyaline, continuous or rarely with a single septum below, 70—125 x 3—4 μ. Conidia oblong-obovate, continuous, 18—25 x 8—11 μ.

On leaves of *Rumex*, Massachusetts (Farlow).

38. RAMULARIA PYROLÆ (Trelease). Prelim. List. parasit. Fungi. Wis. p. 14.

Spots circular, dark. Conidia colorless, round-oval to oblong, frequently acute at one end, 3½—6 x 6—17 μ, usually 4 x 12, not septate.

On leaves of *Pyrola rotundifolia*, Wisconsin (Trelease).

39. RAMULARIA ISARIOIDES (Sacc.) Mich. II, p. 58. *Oidium irregulare*. Pk. 33d Rep, p. 29.

Spots amphigenous, brown, with a narrow, darker border. Hyphæ hypophyllous, densely fasciculate, generally appearing along the nerves of the leaf, filiform, very long (100—150 x 2 μ), continuous, hyaline above, yellowish below. Conidia broad, fusoid or ovate, 10—18 x 4—6 μ, subapiculate at each end, continuous, hyaline.

On leaves of *Staphylea trifolia*, Penn. (Martin) Wisconsin (Trelease).

b. Conidia uniseptate.

40. RAMULARIA DIDYMA, Unger. Exanth. p. 169. *Didymaria Ungeri*, Cda.

Spots orbicular (2—4 mm.), black at first then dirty white with a black center, a large part of the leaf becoming finally dark brown or nearly black, but still showing the lighter colored spots. Hyphæ mostly hypophyllous fasciculate, 30—50 x 4 μ, toothed above and subgeniculate.

Conidia ovate-oblong, 20—35 x 6—8 μ, uniseptate. These notes are from specimens on *Ranunculus Pennsylvanicus*, collected at Charles City, Iowa, by Prof. J. C. Arthur.

Specimens on *Anemone Virginiana*, sent by Mr. E. W. Holway from Decorah, Iowa, differ only in the absence of the light colored spots, the affected parts of the leaf being of a nearly uniform dark brown.

41. RAMULARIA CRYPTA, Cke.

We find no published description of this species, and on the specimens distributed in Ravenel's Fungi Americani, no. 581 we can not find any *Ramularia*.

ALPHABETICAL LIST OF HOST-PLANTS.

(The references are to the serial numbers in the preceding descriptions.)

Actæa alba (Ramularia Actææ, Ell. & Hol.) 27.
Andromeda racemosa (R. Andromedæ, E. & M.) 20.
Aster (R. filaris, Fres.) 32.
Aster puniceus (R. filaris, Fres.) 32.
Astragalus (R. Desmodii, Cke., var. epiphylla) 31.
Astragalus Canadensis (R. Astragali, Ell. & Hol.) 25.
Azalea nudiflora (R. angustata, Pk.) 17.
Celastrus scandens (R. Celastri, E. & M.) 4.
Celtis occidentalis (R. Celtidis, E. & K.) 6.
Desmodium (R. Desmodii, Cke.) 31.
Diervilla trifida (R. Diervillæ, Pk.) 3.
Euonymus atropurpureus (R. Euonymi, E. & K.) 11.
Fragaria (R. Tulasnei, Sacc.) 7.
Grindelia squarrosa (R. Grindeliæ, E. & K.) 35.
Hamamelis Virginica (R. Hamamelidis, Pk.) 12.
Heracleum lanatum (R. Heraclei, Sacc.) 33.
Ilex verticillata (R. Prini, Pk.) 2.
Impatiens fulva (R. Impatientis, Pk.) 14.
Mimulus ringens (R. Mimuli, E. & K.) 18.
Mitella diphylla (R. Mitellæ, Pk.) 22.
Myrica (R. monilioides, E. & M.) 36.
Nasturtium Armoracia (R. Armoraciæ, Fckl.) 9.
Nemopanthes Canadensis (R. Nemopanthis, C. & P.) 23.
Orontium aquaticum (R. Orontii, E. & M.) 19.
Oxalis acetosella (R. Oxalidis, Farlow) 26.
Plantago major (R. Plantaginis, E. & M.) 5.
Polygonum amphibium, var. terrestre (R. rufo-maculans, Pk.) 15.
Potamogeton lonchites (R. aquatilis, Pk.) 1.
Potentilla Norvegica (R. arvensis, Sacc.) 8.
Prinos verticillata (R. Prini, Pk.) 2.
Pyrola rotundifolia (R. Pyrolæ, Trelease) 38.
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MICROSPHAERA FULVOFULCRA, CKE.

Prof. Wm. R Dudley, of Cornell University, in a recent communication called my attention to the fact, first detected by Miss Martha Merry, a student in his laboratory, that the specimens distributed in the North American Fungi, no. 1323, under the above name are a *Podosphæra*, probably *P. minor*, Howe, in Bull. Torr. Bot. Club. vol. V, p. 3. On referring to specimens in my herbarium, sent me from California by Dr. Harkness as *Microsphæra fulvofulcra*, Cke., and which are presumably the same as the specimens examined by Dr. Cooke and published by him in Grev. vol. V, p. 110, as *M. fulvofulcra*, Cke., I find they are the same as the specimens distributed in N. A. F. under no. 1323, being in fact not *Microsphæra* but *Podosphæra*, there being but a single ascus in each sporangium. If, then, the specimens sent me by Dr. Harkness (on *Spiræa*) are really the same as those described by Dr. Cooke in Grevillea, then *Microsphæra fulvofulcra*, Cooke, will have to be cancelled. In any case the N. A. F. specimens and those distributed by Dr. Winter in his Exsiccati, no. 3045, are not a *Microsphæra* but a *Podosphæra* and probably P. minor, Howe.

J. B. E.

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